

PATHWAYS

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LISTENING AIDS THROUGH THE GRADES

Children live in a world of sound. They are bombarded from morning to night not only with the sounds of the physical environment but with words.

Perhaps because there is so much of it, many children learn to ignore talk. They take refuge in "non-listening". They "listen with half an ear" when the radio is playing, but also transfer this habit to other situations such as the classroom when the teacher is giving directions. Some "noises" can be ignored-but not all!

Most of us like to talk more than we like to listen, and so we need help in developing a liking for listening as well as skills in listening. Perhaps this collection of activities can help.

Today children have many purposes for listening. They listen to parent or teacher, they use the telephone, they engage in conversation and discussion, they enjoy stories and factual reports, follow directions or announcements, give some attention to radio programmes, appreciate records, and hear (and see) movies and television programmes. Words like hearing or even listening are not specific enough to describe accurately all of these modern activities.

To aud is "to listen with comprehension and appreciation". Auding is more than hearing or listening because it requires accurate understanding and interpretation of spoken words. It is an integral part of the language arts, or communication arts, which deal with the process of giving and receiving ideas. Such communication is one of man's most important activities.

The teacher should be aware of this close relationship of auding to other language activities. Children's listening will depend partly on such factors as the teacher's own clarity in enunciation and exposition. The quality of speaking or reading aloud by other children in the class will also be a factor which influences a child's auding abilities.

Listening may operate at a number of different levels. Analytical, critical reading and auding are not always necessary; there are many times during the day when children must skim or half-listen. There are times when one must read superficially or cut out most sound. Not all reading or all listening is done in the same way.

Since listening operates at various levels, both teachers and pupils must be aware of the

different ways of listening. In fact, they may deliberately choose at a given time to function at a particular level.

The teacher who is aware of different levels of listening knows that (a) children of any one age differ widely in their auding abilities and (b) different types of listening are appropriate to different occasions. One keynote, therefore is flexibility in classroom listening and auding activities.

With the help of the class the teacher sees to it that a wide variety of auding situations is employed in any one month. These situations may include such activities as informal conversation, sharing, reporting, social courtesies, telephoning, planning, reacting to film strips and movies, storytelling, announcing or giving directions, interviewing, participating in group meetings, choral speaking and dramatization.

A wide variety of materials for the listening programme must be obtained in advance of group or individual activities. Depending on the age of the children, a classroom may contain books for storytelling, choral reading, and dramatization, research sources for social studies, science and health materials, exhibits and bulletin boards, a telephone kit, materials for chart-making, materials for note-taking, copies of rules for school, traffic, or student council, lists of current radio or television programmes, clippings of newspaper or magazine articles, pictures on special topics, film strips and sound movies, and a selection of recordings.

Readiness for specific activities increases the amount of learning. Before auding begins, teacher and pupils usually discuss definite purposes for the activity. If the class is to hear a story, they may look for surprise, for action, for sequence, or for humor in the story. Similarly, they may aud to follow directions, to find main ideas, to note two sides of an argument, or to predict what will happen next. Auding abilities are often specific abilities, and auding can be more efficient if it is directed or focused.

Auding is usually more efficient, not only if it is focused but if it is used in some way. The

group may listen to jot down disagreements, to interpret favourably or unfavorably, or to plan action such as a report or a dramatization.

Auding need not always be intense, analytical or critical. Any teacher may use it as "a change of pace", a chance for relaxation or pleasure, as well as a way of getting information. If creative thinking requires "incubation", a relaxed period spent listening to a story, poem, or record may help the germination of ideas without any forcing by teacher or group.

Children above the first two grades who have not been conscious of their listening skills often become aware of the importance of auding by keeping a record of all their listening activities for a day, a few days, or a week. Such a record includes both in-school and out-of-school activities.

Here is a collection of exercises and suggestions. They should be used selectively and flexibly. They should be fun or of interest in themselves, but they should also be related to a continuing programme of language arts activities.

Kindergarten and Primary Activities

Children come to school with some auding abilities well developed. They are more "ready" for listening than for reading. However, they differ greatly in their abilities to listen with comprehension. Many of them need practice in very simple listening situations as they begin their school careers. These simple listening activities are designed to help prepare the child for reading as well as for effective listening and auding. They include work on the recognition of the sounds, forms, and meanings of whole words and then work with word parts—rhymes, initial consonants, and other consonant and vowel analysis. The teacher should select activities in terms of the needs of pupils.

I. Sounds Around Us

1. What Is It?

The teacher makes familiar sounds like crushing of paper, knocking on a door, tapping a

glass, tapping the desk with a pencil, writing on the blackboard. The children close their eyes and guess what each sound is.

2. What Do You Hear?

The teacher may say, "Let's all sit as quietly as we can. Now what different sounds can you hear?" (Clock ticking, car going by, steps in hall, whistle, dog barking, car horns). Another time she may say, "I hear a sound in the hall. What is it?" Can you make that sound?"

Encourage children in good auditory perceptions such as awareness of differences in tempo, pitch, strength, or quality of sounds (fast or slow steps; different kinds of airplanes, cars, and bells; etc.). Children should report on any unusual sounds they hear at home or at school.

3. Near or Far?

Children may be encouraged to discriminate between sounds that are near and those that are away. The teacher may call attention to the way the sound changes as it comes near and then fades away eg. siren or a moving vehicle.

4. High or Low?

Ability to discriminate between high and low pitches should be developed. A pitch pipe, high and low whistles and gongs may be used for the same purpose. Many games based on "high and low" can be devised, using a song melody or any series of notes.

5. Loud and Soft

Children identify familiar sounds that are very loud and familiar sounds that are very soft; the bang of a hammer and a light tap, a shrill whistle and a whisper, a shout and a conversational tone.

- What sound will a big bell make?
- What sound will a small bell make?
- What sound will a big dog make?
- What sound will a puppy make?
- What sound will a big cock make?
- What sound will a little chick make?

II. Animal Sounds

6. What Animal Am I?

The teacher makes the sounds associated with familiar animals and the children name the animals. The pupils may play a game in two lines; in one line each child makes the sound of an animal while the child opposite him in the other line identifies the animal. Then the activities of the two lines may be reversed.

7. What Sound Do I Make?

Say :

- Pretend you are a bee.
- What sound will you make?
- Pretend you are a frog.
- What sound will you make?
- Pretend you are a duck.
- What sound will a make?
- Pretend you are a kitten.
- What sound will you make?

The song "Old McDonald Had a Farm" will also give fun in making many animal sounds.

8. Roar

The teacher is the animal keeper and gives each child the name of some animal. The animal keeper tells or reads a story about what happened to all these animals one fine summer day. The animal keeper is careful to bring in the name of every animal so that every player will have to get up and pretend to be the animal whose name is mentioned. Whenever the animal keeper mentions the lion, all the players stand and shake their heads and roar as all good lions do. If there are too many in the class to give each child a different animal name, give as many as wanted (usually not more than ten) and let all the others be the lion.

9. Story Sounds

Children enjoy repeating animal sounds or refrains as the teacher tells or reads a story.

III. Imitating

10. Drum Beats

The teacher or a pupil beats on the drum a certain number of times as all the children listen. One child is called on to clap back the

same number. If he responds correctly he may become the next drummer. Begin with simple beats. Then the game may be made more complex by beating fast beats and slow beats combinations.

11. Echo Game

Two children play the game at a time. The child labeled "Speaker" stands in one corner of the room. The child labeled "Echo" stands in the opposite corner. "Speaker" says something in a clear, natural tone. "Echo" repeats the words. Then each child passes his role to an other.

IV. Following Directions

12. You Must

The children form a circle. The leader stands in the center of the circle to give directions. You must walk forwards. You must hop on one foot. You must bend forward. You must stand tall. If the leader gives a direction without first saying "You must," children should ignore it. If they should follow directions which have not been prefaced by "You must," they are out of the game.

13. Bring Me

The teacher tells the group that today they are to play a game in which they must listen carefully. 'It's called Bring Me.' Sometimes I will say your name and then say, 'Bring me the chalk [or a book or something else in the room].' Then you must follow my directions and bring it to me. But if I say, 'Bring me the window,' or 'Bring me the wall,' then you must stay quietly in your chair without moving.'

14. Listen Carefully

Have each child equipped with a blank sheet of paper and color crayons. Give three or four simple directions such as :

1. Draw a red line near the top of your page.
2. Draw a blue cat near the middle of your page.
3. Take the black [or yellow] crayon. Draw the first letter of your name [or a round ball etc.] near the bottom of your page.

Repeat the directions carefully and have each child check his own page (or another's) soon after the first drawing. At a later stage directions may become a little more exacting.

V. Identifying People

15. Who Am I?

One child is blindfolded. The teacher points to another child, who then calls out, "Who am I?". If the listener cannot identify the speaker in three guesses he takes his seat and another child is chosen as listener.

16. Who Has The Bell?

One pupil is selected to be 'the listener.' He stands in the front of the room with his back to the class. The leader moves quietly around the room with the bell, which he places in the lap of some child. The leader then goes to the front of room and says "Ring the bell, who has the bell?" The child who has the bell then rings it. The listener has three guesses to find out the name of the child who rings the bell. If he names the child correctly, the listener becomes the next leader and the bell-ringer becomes the next listener. If he does not succeed in naming the bell-ringer in three guesses, another listener is chosen.

17. Animal Blindman's Buff

The players form a circle. "It" is blindfolded and stands in the center of the circle. All the players take the parts of animals such as a dog, cat, lion, hen, or mouse.

The blindfolded player calls upon some animal by saying "Speak, Dog, speak," or "Speak, Lion, speak." The animal actor answers with his characteristic vocal sound: that is, with a bark, mew, moo, or squeak etc. The blindfolded player has three guesses in which to identify the child making the animal sound. If he succeeds, the actor is the new "It." If he fails, he calls on another animal to speak.

VI. Rhyming

18. We Sound Alike

The teacher may interest the children in rhyming words by making simple two-line jingles

about familiar things or people. She will ask, "Do you hear the words that sound alike in this jingle?"

Rani likes to play
On a sunny day.
Roopak gave his toy
To a smaller boy.
Ahmed threw the ball
Over the high wall.

The game should be played for short periods, orally—the rhyming words should only be heard, not written on the chalk board.

19. Which Two Rhyme?

Ask the children to choose the two words which rhyme in a group of three like, "saw, paw, dog." After the idea of the rhyming pair is understood, say the following groups. Make sure that the same emphasis is given to all three words.

tell, honk, sell	bee, see, tall
man, can, toy	hall, tie, wall
hall, ride, ball	bear, pear, rode
boy, joy, hope	

Later the class may divide into two groups to compete for high scores. Familiar nursery rhymes too will give fun in recognizing rhyming words. This is a game to repeat, rather than to continue long at one time.

VII. Interpreting Meaning

20. I Am Thinking Of A Word

The teacher says, "I am thinking of a word that tells something you sit on [chair]," or "I am thinking of a word that tells something cold you like to eat [ice cream]." The child who guesses the correct word is then allowed to be the next leader.

21. How Do You Feel?

The teacher needs to prepare children to listen for changes of feeling and mood. The teacher and children may discuss how people or animals show their changes in mood. Ask questions to stimulate listening. For example; "If a boy were happy, would his voice sound the same as if he were disappointed?"

After a story telling session discussion may highlight how the characters showed their feelings with their voices or the sound that they made.

Choose poems in which the refrain helps tell the story, as in "The Gray Mare." Teach the refrain first (in this case, "He, haw hum"). Then tell the children that each time the refrain is spoken it must show something about what the story is telling and should change as the story changes. Then say the main lines and let the children give the chorus.

John Smith had a little gray mare.

He, haw, hum.

Her tail was long and her back was bare.

He, haw, hum.

John Smith went riding up Shooter's bank.

He, haw, hum.

The mare began to kick and to prank.

He, haw, hum.

John Smith went riding up Shooter's hill.

He, haw, hum.

The mare fell down and made her will.

He, haw, hum.

The bridle and saddle were laid on the shelf,

He, how, hum.

If you want anymore you must sing it yourself.

He, haw, hum.

(Traditional)

22. Opposites

A simple listening game involving meaning and interpretation is played by a small group of about equal ability. Say a word and ask a child to say the word that means just the opposite of the word you say. Each child keeps her his score. Use simple words with rather obvious opposites "up-down," "big-little," "stop-go," "work-play," "young-old," "sweet-sour," etc. This is a "listening and thinking" game.

23. Story In Pictures

Children may listen to connect words or short stories with pictures. After placing two mounted pictures on the chalkboard ledge, the teacher may say, "I am going to say two words. One of them tells about a picture. Listen carefully to tell me which picture goes with the right word." Example: pictures on ledge are cow, dog, man; the teacher says, "horse dog"; and children point to the picture of the dog. Use a variety of pictures and word pairs.

This game may be changed to require higher-level listening by having the members of the group identify the proper picture to go with the parts of a simple story. Mounted pictures may be made from illustrations cut from inexpensive books of folk tales and short stories. First have the children listen to the whole story: then say, "Look at the pictures of our story on the chalkboard ledge. Now listen to the story again. When I come to a place in the story that a picture tells about, put up your hand. Be ready to show the picture that goes with a part of our story." With practice, children will progress from a "two-picture story" to a "five-picture story."

(To be continued)

भाषा ज्ञान - खेल खेल में

हम अध्यापकगण कक्षा में बहुत कुछ बच्चों को पढ़ा तो देते हैं। नए शब्द, व्याकरण सम्बन्धी और पुस्तकों से बहुत सी बातें बच्चों के छोटे से मस्तिष्क में दूँस देते हैं पर उसके बाद कितना समय हम पुनरावृत्ति पर देते हैं या जानने का प्रयास करते हैं कि हमने जो कुछ उन्हें पढ़ाया या सिखाया, उसका कितने प्रतिशत उन्होंने ग्रहण किया।

आइए, हम सब क्यों न ऐसी विधि का प्रयोग करें जिसमें बच्चों का खेल भी हो जाए, पाठ का दोहराना भी। यह खेल हाउसी या तम्बोला पर आधारित है। व्याकरण में, एक शब्द के उत्तर में और जहाँ तक कि सब विषयों में इसका प्रयोग किया जा सकता है। इसके लिए अध्यापक को अधिक परिश्रम करने की जरूरत नहीं। हाउसी की टिकट बच्चे स्वयं तैयार करके ले आएँगे। बस एक बार बोर्ड पर बना कर दिखा दें। 5"×3" का एक आयताकार कागज काट लें, उस पर एक इंच के वर्ग बना लें जैसाकि नीचे दिखाया गया है।

5"				
3		37		31
जीवन				
	15	26	30	
9	19		34	48

पाठ या व्याकरण से सम्बन्धित जितने प्रश्न अध्यापक ने बनाए हैं (माना कि पचास प्रश्न बनाए हैं) उसके अनुसार किन्हीं दस वर्गों में एक से पचास के बीच कोई भी गिनती कोने में लिख दें।

प्रत्येक कक्षा में छात्रगण अपनी टिकट लेकर तैयार बैठ जाएँगे। अध्यापक भी अपने प्रश्नों की सूची के साथ तैयार हो जाएँगे। एक से पचास तक टोकरी में नं० होंगे। अध्यापक टोकरी में से कोई एक नं० निकालेंगी मान लिया (१) नं० निकला। सभी छात्र जिनकी टिकटों में १ नं० है, सतर्क हो जाएँगे। अब अध्यापक अपनी नोटबुक से प्रश्न नं० १ पढ़ेंगे और उसका उत्तर (एक शब्द में) बच्चे १ नं० के वर्ग में लिख लेंगे। इसी प्रकार बीच-बीच में से नं० निकाल कर उनके अनुसार अध्यापक प्रश्न पढ़ेंगे और छात्र जिनकी टिकट में वह नं० है उसका उत्तर अपनी टिकट में लिख लेंगे। इस प्रकार दस खाने पानि कि पूरा हाउस

जिसका हो जाएगा वही बिजयी घोषित होगा और प्रश्न आएगा। इसी तरह धीरे-धीरे दूसरे छात्रों के हाउस भी पूरे होते जाएँगे। इन टिकट को अध्यापक संशोधन के लिए भी ले सकता है तथा कक्षा परीक्षा के रूप में उन पर शंक दिए जा सकते हैं। या फिर अध्यापक एक-एक करके प्रश्न पढ़कर बच्चों से उत्तर पूछकर बच्चों से ही संशोधन करवाया जा सकता है।

उदाहरण के लिए हमने 'कबीर' पाठ बच्चों को कक्षा में पढ़ाया। उसके बाद उसी से सम्बन्धित एक शब्द के उत्तर वाले प्रश्न तथा व्याकरण सम्बन्धी प्रश्न तैयार कर लिए, जैसे ये दस प्रश्न नमूने के तौर पर नीचे दिए हैं।

१. कबीर के पिता का नाम क्या था?
२. कबीर किसके शिष्य बनना चाहते थे?
३. मृत्यु का विलोम लिखो।
४. पुण्य का समानार्थक शब्द लिखो।
५. उन्नति का विलोम बताओ।
६. कबीर के पिता क्या काम करते थे?
७. जो ईश्वर में विश्वास करे उसे क्या कहते हैं?
८. आवश्यक का विलोम बताओ?
९. गुरु जिसको शिक्षा देता है उसे क्या कहते हैं?
१०. 'स्त्री' शब्द का वचन बदलो।

इस प्रकार प्रश्न सूची तैयार किया गया। खेलते समय पूरी कक्षा अपना नं० जानने व प्रश्न सुनने के लिए बड़ी सतर्क रहती है और अपने नं० के अनुसार उत्तर लिख देती है। उन्हें मालूम है कि एक बार बोला गया नं० तथा उसका प्रश्न दुबारा नहीं बोला जाएगा इस लिए बड़े ध्यान पूर्वक कक्षा में सुनते हैं। इससे उनकी श्रवण शक्ति भी बढ़ती है तथा आपस में किसी से सहाय करने का भी कोई प्रयत्न नहीं करते हैं।

इस विधि से पाठ की पुनरावृत्ति भी हो जाती है तथा बच्चे खेल-खेल में बहुत कुछ जान लेते हैं, शकते भी नहीं। कक्षा में धुललेख भी इस आधार पर दिया जा सकता है।

इस विधि का प्रयोग मैंने बहुत सी कक्षाओं में किया है और उद्देश्य की प्राप्ति में शत प्रतिशत सफलता मिली है।

नीलम आनंद

श्री बेलन स्कूल, (हिन्दी विभाग)

PAINT AND PRINT

Straw Painting

1. Use a spoon to place a drop of paint on a piece of shiny paper.

2. Place one end of a drinking straw near the drop of paint. Blow gently through the other end of the straw to spread out the paint. Move the paper around as you blow. The paint will spread out in different directions. Now place a few drops of the other colors on the paper and blow them around.

3. When you finish your picture, let it dry on a layer of newspaper. Some of the blown designs may look like trees or animals. Draw around these shapes with a felt-tip pen so they stand out. You might like to use your paper for gift wrapping.

Materials

- ☐ felt-tip pen
- ☐ paper
- ☐ tempera paints (three colors)
- ☐ spoons (three)
- ☐ straws (drinking)



Gay Wrappers

1. Pour a little of each color into different containers. Add a little water to each color.

2. Pleat the paper in even strips, the long way. Keeping it folded, pleat it again the other way.

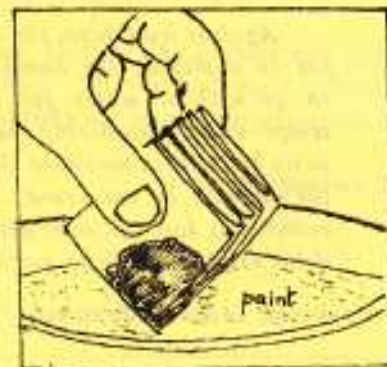
3. Hold the paper in the middle to keep the pleats together. Dip a corner into one of the colors. The color will spread quickly, so take the napkin out as soon as the color starts to spread.

Now dip a second corner into another color. Then dip a third corner into the last color.

4. Unfold the paper very carefully and lay it on a layer of newspaper to dry. When it is dry, you can use it as gift-wrapping paper for sweets or chocolates. Or, glue it to a piece of card paper to make a greeting card. You could also cut it into long strips and glue them together to make colourful streamers for decorating your room.

Materials

- ☐ poster colours or powder paints
- ☐ saucers/containers
- ☐ paper—8" squares
- ☐ scissors and gum



Colourful Geometry

1. Draw a few simple shapes on a piece of thick cardboard. Cut out these shapes.

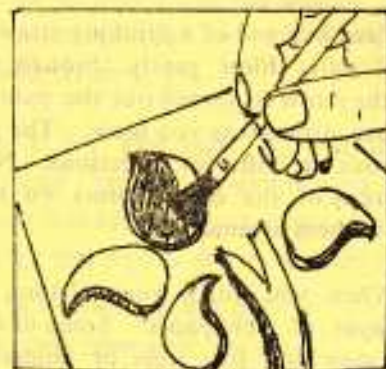
2. Cut a large rectangle of cardboard. Arrange the cut-out shapes on this cardboard. When you like the way you have arranged the shapes, glue them in place.

3. Mix some paint and gum in a container. Use a paintbrush to cover each cardboard shape with a thick layer of paint. Use one color for all the shapes, or paint some of them different colors.

4. Place a piece of typing paper on top of the paint-covered shapes. Rub your hand over the paper, pressing down hard. Hold the paper by one corner and peel it off. You now have a print of the cardboard shapes.

Materials

- ☐ thick cardboard
- ☐ scissors, gum/Fevicol
- ☐ paint and brushes
- ☐ paper



THE SECRETS OF THE CAMEL— DO YOU KNOW THEM?

The camel is a nasty animal. It kicks, bites and spits—and whines when a load is placed on its back. Worse, perhaps, it resists commands. Yet the tribes of the Arabian Peninsula could not have survived without it. For more than 3,000 years the camel has been their beast of burden and means of transport, as well as source of food, leather and wool. And despite its disposition, the Arabs came to love it.

The camel is perfectly adapted to its desert environment. Not only can it shut its nostrils against wind-blown sand, but it can flick away grains that get in its eyes with a pair of third eyelids. Leathery pads on its feet keep it from sinking into sand. And a remarkable digestive system enables it to eat just about anything, including leather, cloth and bone. The interior of its mouth is so tough that even thorns will not puncture the walls, and its stomach acts as a fermenting vat where bacteria break down all it swallows.

Against lean days, the camel stores fat—not water—in its hump. As the fat is depleted, the hump shrinks and flops to one side. The camel's ability to go without water for days at a time is due to a unique mechanism. Its temperature rises during the hottest part of the day, and the heat is retained in its body; thus moisture that would go into the manufacture of sweat to cool the animal is conserved. At night the excess heat is released. Still, the camel may lose up to 30 per cent of its weight through dehydration. One long drink is all it needs to put the weight back on.

From: Arabian Peninsula (Library of Nations, Time-Life Books, Amsterdam)

WHEN CHILDREN BECAME PLANETS FOR A WHILE

If you turn the pages of a language textbook you can find that :

" On *Shankranthi* day the Sun will enter into the Zodiac sign of the crocodile "

If you turn the pages of a social studies textbook of the same class you can find :

" The Sun and stars do not move. The Earth and other planets rotate around the Sun "

Certainly language teachers are not so traditional and ritualistic that they still consider that the Sun and the Moon are planets! We do not know, whether they know or not that the Uranus and the Neptune are the 8th and 9th planets in our solar system, but, they still teach that *Rahu* and *Kethu* are planets mentioned by myths! They still teach that the solar eclipse occurs because *Rahu* swallows the Sun on that day! Some language textbooks actually support this concept!

This confusion between language, social studies and science textbooks exists. Some of our textbooks are unscientific and unrealistic. And moreover there is no co-ordination in the writing of language and science textbooks. Likewise there is little co-ordination between teachers while they teach! They teach according to their text books, to complete a syllabus! How can we let our children grow up with the most unscientific, unrealistic and confusing thoughts!

In the science period I asked 12 children of my school to stand in a circle. One boy stood in the middle of the circle. One girl was rotating around that boy in the centre. That boy

was the Sun. The rotating girl was the Earth. The 12 boys in the circle were the 12 zodiac signs. I drew the same picture on the black-board.

Suddenly I asked the Earth to stop somewhere. Earth stopped. I asked: "Vijaya! How do you see Mastan? where is he?"

Vijaya answered, "Mastan is in front of Jaya"

"So, if Mastan is the Sun, if Jaya is the Zodiac sign of the Virgin, where does he seem to be? . . ."

Vijaya again replied "The Sun is in front of the zodiac sign of the Virgin". Again, the Earth started rotating around the Sun. She stopped here and there, and observed the position of the Sun. In this game the Sun and the zodiac signs were not moving, only the Earth was rotating

"Earth! Now how do you see the Sun?"

"He is in the zodiac sign of the crocodile"

"So, due to the Earth's rotation, we feel that the Sun enters into the different zodiac signs and travels through them over a period of a month. That is why we feel that the Sun enters into the zodiac sign of the crocodile on the *Shankranthi* day"

Children became the planets and zodiac signs for a while! They experienced the complexity and the variety of the movements of the heavenly bodies.

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HOW TO SOLVE MATHS PROBLEMS—4

Number Sentences

Children can be better problem-solvers if they can change math problems, spoken or written in words, into numbers. Usually they have to figure out which operation to use. Look at the problem below, and complete the sentences about it.

Problem: Our team eats 3 pizzas after every game. Last month we played 9 games. How many pizzas did we eat?

1. The unknown is the total number of——
2. The same number of pizzas is eaten after each game. That number is——
3. The number of games played last month was——
4. The idea of 3 pizzas being eaten 9 times translates to the math operation of multiplication. The words three times nine can be written in a number sentence as $3 \times 9 = \square$

The answer to the problem is——

To strengthen this skill, create a **Number Sentence Bank** containing several items like this $9 + 7 = \square$, $63 \div \square = 9$, $\square \div 9 = 7$ etc.

Ask the students to match these number sentences with the verbal ones given below and then complete the number sentences.

- Sixty-three divided by a number equals nine. $63 \div \square = 9$.
- Nine times seven is a number.
- Nine minus a number is two.
- A number added to nine is sixteen.
- Seven nines are a number.
- A number divided by nine is seven.
- A number less two is seven.
- Nine minus seven is a number.
- Nine plus seven is number.
- A number times nine is sixty-three.

Use the Guess-and Check Strategy

Solving maths problems involves using strategies—a variety of strategies. The first of these is to take a guess at the answer. To do this successfully one must turn the guesses into questions whose answers can be checked. Here are some samples.

Problem 1: I'm thinking of a number from 1 to 10. What is the number? You have 3 guesses.

You have 10 numbers to choose from, but you only have 3 guesses. Suppose you can turn 2 guesses into questions. Then you may be able to get closer to the right number.

Study the six questions below. They are questions you might ask about the problem above. Imagine that the answers to the questions will be yes or no. Circle two questions you would ask before you guess which number solves the problem. Choose questions that will help you narrow down the numbers you have to choose from.

- i. Is the number 7?
- ii. Is the number from 1 to 5?
- iii. Is it an odd number?
- iv. Is the number 0?
- v. Is the number from 6 to 10?
- vi. Is it an even number?

Answer these questions about the 6 questions above.

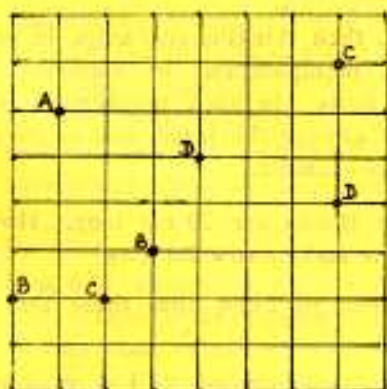
- Why wouldn't you ask both questions ii and v?
- Why wouldn't you ask both questions iii and vi?
- Why wouldn't you ask question i?
- Why wouldn't you ask question iv?

Suppose you ask questions ii and vi. Suppose the answer to both questions is no. What two numbers are left to choose to solve the problem?

Guessing wisely can help you to solve problems. Asking yourself questions about your guesses will help you stay on the track. Now put your guesses and questions to work. Solve the problems below.

Problem 2: Cut a rectangular cake in eight equal pieces in as many different ways as you can. The eight pieces may be any shape, but they must be equal. You can show ways to solve the problem on scrap paper.

Problem 3: Connect point A to point A, point B to point B, point C to point C, and point D to point D. You must follow lines on the grid. No line should touch or cross another.



(See correction on page 12)

Problem 4: Find four numbers from among 6, 4, 10, 15, 12, 2, 8 that will add up to exactly 41. See how many different ways you can score 41. You may use a number more than once during a turn. One possible answer is 12, 15, 10, 4. (Hint. Once you discover one solution, study the numbers you used. They will help you discover other solutions.)

Use if.....Then Thinking

This is another useful problem-solving strategy, a way of drawing conclusions. For example, if someone hasn't eaten for several days, then we can draw the conclusion that the person is hungry.

If..... then thinking can help you solve math word problems. If you use the strategy

thoughtfully, then you may be able to solve problems more easily.

Sometimes you're not sure which math operation to use. There are five **if then statements** that could help you to decide. Read the five statements below and do the sample problem after each.

Statement 1. If the problem seems to call for putting two or more different numbers together, then you should add.

Problem: Reema collected 34 stamps. Radha collected 29. How many stamps did Reema and Radha catch in all?

Statement 2. If the problem seems to call for increasing or repeating one amount a certain number of times, then you should multiply.

Problem: A baby hippo gains 2 kilograms a day. How many kilograms will it gain in 19 days?

Statement 3. If the problem seems to call for taking a certain amount from a number, then you should subtract.

Problem: A truck carried 5,497 litres of oil. It delivered 2,378 litres to a customer. How many litres remained on the truck?

Statement 4. If the problem seems to call for comparing two numbers, finding the difference between them, or seeing which is bigger, closer, etc., then you should subtract.

Problem: One snake is 87 centimetres long. Another is 62 cm long. What is the difference between the lengths of the snakes?

Statement 5. If the problem seems to call for separating parts of an amount into groups of the same size, then you should divide.

Problem: Basketball teams are made up of 5 players. How many teams can be made from 55 players?

Several problems like the samples given below should be made up for students' practice.

1. A nilgai weighs 400 kilograms. A baby elephant weighs 700 kilograms. How much heavier is the baby elephant?
2. Last week Rohan ate 3 oranges, 4 apples, and 2 bananas. How many fruits did he eat?
3. At each circus performance, an elephant showers water on a clown 3 times. How many times does the elephant do this in 14 shows?
4. There were 659 sea gulls on the beach. When 235 of them flew off, how many were left on the beach?
5. There are 24 scouts in a troop. They are going on a trip, and 4 scouts will ride in each car. How many cars will be needed?

Sometimes problems seem too hard to solve. This is another time when if . . . then thinking can help you. Look at an example.

Problem: Our school band had sellouts for every one of our 23 concerts. There were 832 people at every concert. How many people attended in all?

1. To make a hard problem easy, you can change the big numbers. If you use only the first numeral in the numbers of the problem above, then you would change 23 concerts to 2 concerts and 832 people to _____ people.
2. Now the problem says there were 8 people at every concert, and there were _____ concerts.

3. If there were 8 people at each of the 2 concerts, then there were _____ people in all.
4. If you multiply 8×2 to solve the easy problem, then to solve the hard problem, you multiply $832 \times$ _____.
5. If the numbers in any problem seem hard, then to help solve the problem, you can change the big numbers to small _____.

Use the same idea for more problems like this one.

Problem: One day, 1342 ants marched to a picnic. Later, 2978 ants marched to the same picnic. How many ants were at the picnic in all?

If . . . then thinking also helps in problems involving manipulation of elements having different units. In such problems it is always better to change the larger unit to the smaller. Here is an example.

Problem: Bricks are 20 cm long. How many are needed to make a row 2 m long?

You need to know that there are 100 cm in 1 m.

If there are 100 cm in 1 m, then there are $2 \times 100 = 200$ cm in 2 m.

Each brick is 20 cm long.

Hence the row will have $200 \div 20 = 10$ bricks.

A Correction: The second point A has been inadvertently left out of the figure on page 11. It lies along the bottom edge of the grid. Count three squares from the left and mark it, please.

WATER BALLET

Here is an interesting science activity for your students. Cut chart paper into small pieces about 3 cm square. On one side of each square draw a colourful clown face. Use wax crayons to colour these faces and then set them aside.

Fill an ice-cube tray half full of water. Place it in the freezer till a little ice begins to form. Then take the tray out and place a clown face on each cube. Carefully pour in more water till the tray is full. Then freeze the ice cubes till they are solid.

Fill a large basin with warm water. Put two or three of the clown cubes in the basin. In a minute or so the ice-cube clowns will begin to flip and turn, performing an attractive water ballet.

Can you figure out why this happens? Then see page 16.

A MATHEMATICAL CALENDAR

ANSWERS

- Divide 210 by 5 and that will be the middle number. The numbers are 40, 41, 42, 43, 44.
- A number divisible by 33 is divisible by 3 and by 11.
Therefore $a + b + 13 = 3N$
 $a + b - 13 = 11K$
Since a and b are both digits 0 through 9, $0 < a + b < 18$. Therefore $a + b$ could take the values 2, 5, 8, 11, 14 or 17 in (1) and the values 2 and 13 in (2). The only value for $a + b$ is 2, which satisfies both equations. Therefore $a = b = 1$ or $a = 2$ and $b = 0$, yielding 121308 and 220308 as the only solutions.
- Rs 1.19 as 3 coins of 25 p, 4 coins of 10 p, and 4 coins of 1 p; or 1 coin of 25 p, 9 coins of 10 p, and 4 coins of 1 p; or one coin of 50 p, 1 coin of 25 p, 4 coins of 10 p, and 4 coins of 1 p.
- Form a tetrahedron, above and below the original triangle
- Ram is 51 and his brother is 35

	Is	Was	Was
Brother	b	$3b - (R - b)$ $- 2b - R$	$3b - 2R$
Ram	R	b	$2b - R$

$$R = 17(3b - R)$$

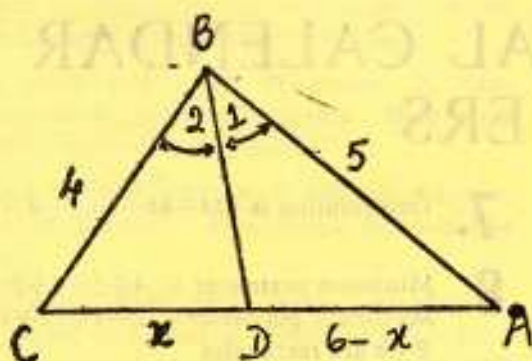
$$R = 51b - 34R$$

$$35R = 51b$$

$$35/51 = b$$
- $W1 = A$
 $(W + 2)(1 + 3) = A + 50$
 $(W + 3)(1 + 2) = A + 52$
 Solve for this and you will get $W = 8$ and $1 = 10$.
- One solution is $444 + 44 + 4 + 4 + 4 = 500$
- Minimum perimeter = $4 + 3 + 4 + 3 = 14$
Maximum perimeter = $12 + 1 + 12 + 1 = 26$
Both are rectangles
- Height BF can be calculated using the Pythagorean triplet 5, 12, 13. $BF = 156$; The area of the triangle is $(156 \times 130)/2 = (169h)/2$; therefore $h = AE = 120$
- Neither H nor W can be 0.
W must be 1; H must be 5, 6, 7, 8 or 9
On trial $H = 9$; L must therefore be 0;
Therefore one solution is: $F = 2$; $E = 4$;
 $L = 0$; $A = 8$; $O = 6$; $H = 9$; $W = 1$

9	8	0	2	
+	9	8	0	2
<hr/>				
1	9	6	0	4
<hr/>				
- $(X - 49)/7 - 1 = (X - 49 + 7)/7 = (X - 42)/7$
- The five weights are: 1, 3, 9, 27, 81 kilos each.
- $8! / 4! = 4! = (8, 7, 6, 5, 4!) / 94! 4 3 2) = 70$
Total possibilities = $2^8 = 256$
The probability of having 4 boys and 4 girls
 $= 70/256 = 35/128$
- Since there were six darts, the score ought to be even. It cannot be 4, since the minimum should be 6. It cannot be 56, since the maximum would be $6 \times 9 = 54$. Hence the only other even number is 28.
- 39 and 95
Two digit numbers that are 1 less than a multiple of eight are: 15, 23, 31, 39, 47, 55, 63, 71, 87, 95. Out of this, 39 and 95 are also 3 less than a multiple of seven.

16.



Bisect angle B. Because the bisector of an angle of a triangle divides the opposite side into segments proportional to the other sides of the triangle,

$$x/4 = (6-x)/5$$

$$\text{or } x = 8/3$$

$$\text{Then } 6-x = 10/3$$

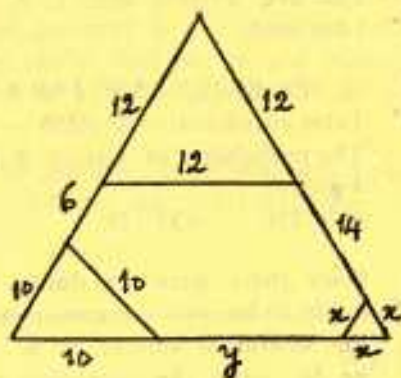
Triangle BDC \sim triangle ABC, since they share angle C and their sides are proportional ($4 : 8/3 = 6 : 4$)

Thus measure of angle A = measure of angle 2 = measure of angle 1 and measure of angle B = twice measure of angle A.

17.

$55/24$. Since the whole number part of the continued fraction is 2 and $55/24 - 31/24 = 24/24 = 1$, change the 2 to a 1.

18.



Extend the sides of the hexagon to form an equilateral triangle as shown and note that the smaller triangles formed are also equilateral. Each angle of the hexagon is 120° and its supplement is 60° .

$$\text{Then, } x + 14 + 12 = 12 + 6 + 10$$

$$\text{and } x + y + 10 = 12 + 6 + 10$$

$$\text{Hence } x = 2 \text{ and } y = 16$$

19.

$$100, 50;$$

$$(2x - 25) / (x - 25) = 3/1;$$

$$\text{hence } x = 50 \text{ and } 2x = 100$$

20.

$$2x + x\sqrt{2} = 2m$$

$$x = 2m / (2 + \sqrt{2})$$

$$\text{Area} = x^2/2 = (1/2)[2m / (2 + \sqrt{2})]^2$$

$$= m^2 / (3 + 2\sqrt{2})$$

$$= m^2 / (3 - 2\sqrt{2})$$

21.

$$1/4! = 1/24$$

22.

$$29. \quad x(5) + 4(1) = 4(6) + x$$

$$5x + 4 = 24 + x$$

$$4x = 20$$

$$x = 5$$

$$54_5 = 45_6 = 29$$

23.

$$2^{10} = (2^2)^5 = 8^5 \dots\dots (1)$$

$$3^{10} = (3^2)^5 = 9^5 \dots\dots (2)$$

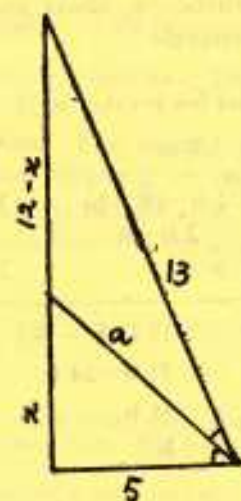
$$(1) < (2)$$

24.

$$A = d^2/2 \text{ and } A = \pi r^2$$

$$d : r :: \sqrt{2\pi} : 1$$

25.



$$13/(12-x) = 5/x$$

$$x = 10/3$$

$$a^2 = x^2 + 5^2$$

$$a = 5\sqrt{13/3}$$

26. Do as in problem 23

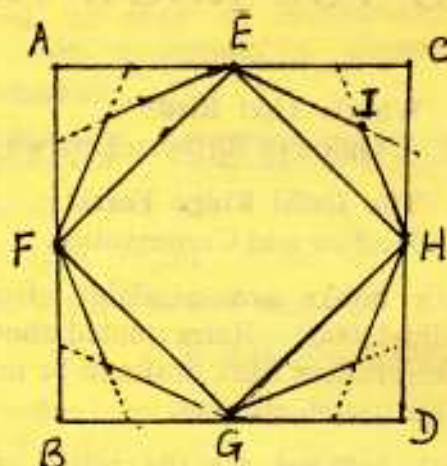
27. 5 p has only 5 p, p, 5 and 1 as factors.
The sum is $5p + p + 5 + 1 = 6p + 6$

28. 5

92. $x/2 + 2x/3 = 42$ hence $7x/6 = 42$ and $x = 36$

30. $1 + 1/2 + 1/3 + 1/4 + 1/6 + 1/8 + 1/12 + 1/24$
 $= (24 + 12 + 8 + 6 + 4 + 3 + 2 + 1)/24$
 $= 60/24 = 2 \frac{1}{2}$

31.



Fold CD over AB to obtain the mid-points E and G. Similarly obtain F, H. Then crease the square EHGE. Now fold CH on EH and EC on EH. The point where the creases cross will be I. Do the same at the other three corners to outline the octagon.

CALCULATOR GAMES

The Wicked Calculator:

Two persons play this game. In addition to the calculator, they need a notepad and a pencil to keep a record of their moves. In turn, each player presses a number between 1 and 9 and follows it with the + sign. The aim is to reach a total of 21. Each number may be pressed only once.

eg. $3 + 2 + 5 + 1 + 6 + 4 = 21$

As each number can be used only once, the game requires a certain strategy; two or three steps must be planned in advance. Each player needs to watch out that he/she does not permit the other player to win, apart from trying to reach a total of 21 as quickly as possible.

The Writing Calculator:

Try out these number combinations at first, one after the other. In each case turn your calculator upside down to read the words.

0.7734	=	hello
3705	=	sole
77345	=	shell
3045	=	shoe
710	=	oil
35006	=	goose
5507	=	loss
35007	=	loose

With a little imagination and some practice, once you have learnt the numbers which can convert to letters, you can write several words of your own.

DO YOU KNOW ABOUT.....?

1. What's That Bird?

(Rs. 30/-)

A Guide to Birdwatching with special Reference to Delhi.

2 The Delhi Ridge Forest

(Rs. 10/-)

Decline and Conservation

Both books are available from **KALPAVRIKSH**, C 17/A Munirka, New Delhi-110067. Rates quoted above include mailing charges within India. Cheques/postal orders/bank drafts to be made in favour of Kalpavriksh. Please add Rs. 7/- to outstation cheques.

Both volumes are the result of personal experiences and involvement and have obviously been backed up by detailed study and research. They contain lists of references for further information. With a growing awareness of environment issues and an interest in flora and fauna, teachers and students, in Delhi and elsewhere, will find these books a valuable addition to their libraries. The illustrations of birds, although in black and white, are excellent.

If Kalpavriksh could bring out similar guides on the trees, wild shrubs/plants and insects/small animals in Delhi, they would be most useful.

For readers who do not as yet know about Kalpavriksh: it is a youth environmental action group, started in the late 70's by students and young professionals. It works in the areas of environmental education and awareness, research and investigation, direct action, lobbying and litigation. Contact them for help in

- organizing nature walks and trips within and outside Delhi
- nature club activities/workshops
- audio-visual shows, talks, discussions and exhibitions on environmental issues.

A WATER BALLET

In the warm water, the bottom part of each ice cube begins to melt. The cube soon becomes top-heavy and hence it flips over. Then the process repeats itself.